1.0 CUP REPORT 94-3 REVIEW

1.1 Background

The text for Task Assignment 94-3 reads as follows:

The contractor shall analyze the impacts to EDOS in the baseline distributed environment and in the consolidated environment in Task Order Number 94-2 of Receiving high rate science data from X-Band ground stations in lieu of receiving the data via TDRSS. Low rate forward and return service will continue to be through TDRSS. The contractor shall determine the impacts of a mixed mode system, e.g., AM-1 is via TDRSS while PM-1 is via X-Band. This analysis shall identify impacts to the baseline environment, existing external and internal interfaces, changes to the negotiated baseline functions in terms of effort, material, and ODC. In addition the contractor shall assess the feasibility and impacts on the EDOS facilities and develop preliminary equipment layouts. The contractor shall analyze existing EDOS requirements against the X-Band Downlink and identify external dependencies and requirements that require modification. The contractor shall report on the implementation schedule, including integration, testing, and transition to operations activities, impacts vs. the baseline schedule and the consolidated facility schedule. The contractor shall document the impacts on the existing EDOS operations concept and provide projections on required operations staff. The contractor shall establish a schedules and milestones to demonstrate and report progress every two weeks; this task shall be completed no later than September 30, 1994.

The analyzed TRW study report is dated September 30,1994 and contains 65 pages. Most of the report consists of bulletized presentation charts.

1.2 Objective

The objective of this analysis is to answer the following questions:

1. Did the study address all elements of the task SOW? Did they (TRW) answer all of the questions?
2. Did the study identify all of the technical and cost impacts?
3. Did the study consider requirement changes that would be appropriate?
4. Are the answers valid? Can the derivation of the answers be validated?
5. Should the study have addressed additional or different topics?
6. Does the study provide an adequate basis for NASA to make a selection.

1.3 Analysis

Key Assumptions

The following are key assumptions taken from page 8 of the report with comments listed below each one.

- **Task addresses mixed mode only: AM-1 uses TDRSS and post AM-1 spacecraft use X-Band for science data Downlink. All spacecraft receive real-time forward and return link services through TDRSS.**
  No comment

- **Domsat provides 150 Mbps between remote ground stations and EDOS, and is scheduled by Ecom management.**
  Using C or K Band services?

- **A consolidated facility at Fairmont must support two simultaneous return links: 1 K-Band and 1 X-Band, or two X-Bands.**
  What is the maximum bandwidth of the links?

- **Services provided at X-Band sites must be high availability services.**
  High availability services implies redundancy, if so what are the costs associated with this.
- **Remote facility services must provide real time statistics reporting on link quality in addition to line outage protection recording.**
  What type of statistics and what is the cost impact?

- **The MTTRes for a Domsat outage is 4 hours.**
  No comment

SOW

The analysis of TRW report 94-3 is organized to correspond to the Task assignment.

> **The contractor shall analyze the impacts to EDOS in the baseline distributed environment and in the consolidated environment in Task Order Number 94-2 of Receiving high rate science data from X-Band ground stations in lieu of receiving the data via TDRSS. Low rate forward and return service will continue to be through TDRSS. The contractor shall determine the impacts of a mixed mode system, e.g., AM-1 is via TDRSS while PM-1 is via X-Band.**
> Please refer to the diagram on page 9 for the following comments. Observing the data flow between Ecom and the Baseline DPF, is the processing of Science Data done by Ecom? Between Ecom and the EOC does that line represent the transfer of Processed Science Data? Between Ecom and the Baseline DPF, should there be a data flow for Raw Science Data?

Please refer to the diagram on page 11 for the following comments.
Should there be a link between the Remote Services Management and Ecom?

This analysis shall identify impacts to the baseline environment, existing external and internal interfaces, changes to the negotiated baseline functions in terms of effort, material, and ODC.
It is unclear as to what measure of effort is necessary to complete the changes.

In addition the contractor shall assess the feasibility and impacts on the EDOS facilities and develop preliminary equipment layouts.
The preliminary Facility layouts were provided with a top level equipment layout. The addition of a scale to the legend box would enhance the ability to evaluate the equipment layout.

The contractor shall analyze existing EDOS requirements against the X-Band Downlink and identify external dependencies and requirements that require modification.
Requirements that need modification were identified. The information evaluating/analyzing the existing EDOS requirements against the X-Band Downlink and the rationale behind the proposed modifications (Appendix D) were not provided. Detail was lacking with respect to the requirement changes unique to the consolidated Fairmont architecture (page 58).

The contractor shall report on the implementation schedule, including integration, testing, and transition to operations activities, impacts vs. the baseline schedule and the consolidated facility schedule.
Although the implementation schedules were provided, no evaluation or explanation accompanied these charts. In relation to the scheduling impacts (page 31, first bullet) how likely is it that the X-Band remote facilities will be available for the required installation and tests? It would be beneficial to add more detail to this chart.

The contractor shall document the impacts on the existing EDOS operations concept and provide projections on required operations staff.

Projections for Operations staff were provided (page 63-65). More information is needed to evaluate the impacts of the projected operations staff necessary for the Baseline configuration. i.e., the roles and responsibilities, as well as the number of years of experience required to fulfill these projections.

The contractor shall establish a schedules and milestones to demonstrate and report progress every two weeks; this task shall be completed no later than September 30, 1994.
This report did not contain a schedule and milestone chart.

1.4 Conclusions

Below is a summary of how the report met the stated objectives.

- **Did the study identify all of the technical and cost impacts?**
  Since cost was not itemized, it would be difficult to correlate costs against technical impacts.

- **Did the study consider requirement changes that would be appropriate?**
  The identified impacts/changes identified lacked detail on the level of effort associated with their implementation.

- **Are the answers valid? Can the derivation of the answers be validated?**
  Without knowledge of both the cost and effort breakdown it would be difficult to validate the change in cost. There was no documentation to support the cost delta summary (page 25).

- **Should the study have addressed additional or different topics?**
  It would be helpful if the scope of this report was broadened to include more information on the X-Band sites themselves.

- **Does the study provide an adequate basis for NASA to make a selection?**
  A detailed, follow up report is needed for NASA to fully assess the technical and cost impacts associated with the use of X-Band sites.